

Lack of effects of copper gluconate supplementation^{1,2}

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ABSTRACT A double-blind study was done giving 10 mg of copper/day as copper gluconate or placebo capsules for 12 wk. The seven subjects receiving copper gluconate had no change in the level of copper in the serum, urine, or hair. There was also no change in the levels of zinc or magnesium. There was also no significant change in levels of hematocrit, triglyceride, SGOT, GGT, LDH, cholesterol, or alkaline phosphatase. The side effects of nausea, diarrhea, and heartburn were the same in the subjects receiving copper gluconate and subjects receiving placebo capsules. *Am J Clin Nutr* 1985;42:681-682.

KEY WORDS Copper supplementation

Introduction

As part of a study of back pain management, 14 adult patients completed a study wherein 7 received 10 mg of copper/day for 12 wk as copper gluconate and 7 received a placebo capsule. This is to report that there was no change in serum, urine, or hair copper levels in either the copper or the placebo group after 6 wk or after 12 wk of supplementation. There was also no change in serum, urine, or hair levels of zinc or magnesium. The three men and four women patients receiving copper had no significant change in levels of various serum chemistry values. There was no difference in the symptoms of back pain or spine motion or trunk strength between the copper supplemented patients and the placebo patients.

Methods

The 7 subjects completing the 12 wk of copper supplementation included 3 men and 4 women. Their mean age was 42 yr. The study was double-blind. Subjects were seen every 2 wk to evaluate their progress and to provide more copper gluconate or placebo capsules and to encourage compliance. One capsule containing 5 mg of copper or placebo was taken twice a day. Blood, serum, urine, and hair samples were collected at the beginning of the study, after 6 wk of supplementation and at the end of the 12 wk study. Hair samples were obtained from next to the occiput. Hematocrit and serum chemistry testing was done by a commercial laboratory. Copper, zinc, and magnesium levels in serum, urine, and hair were determined in the University of New Mexico School of Medicine, Depart-

ment of Biochemistry Research Laboratory. Serum and urine were stored frozen in polycarbonate tubes and tested in batches using atomic absorption spectrophotometry. The study was approved by the Human Research Review Committee.

Results

There was no significant change in the level of copper, zinc, or magnesium of the serum, urine, or hair samples of these seven subjects during the 12 wk of the study. There was also no significant change in the hematocrit, mean corpuscular volume, serum cholesterol, serum triglyceride, SGOT, serum alkaline phosphatase, serum GGT, or serum LDH (Table 1). Serum potassium did change from a mean of 4.3 mEq/L to 4.0 mEq/L ($p < 0.05$). The incidence of nausea, diarrhea, and heartburn was

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TABLE 1
A comparison of serum levels before and after 12 wk of supplementation with 10 mg of copper/day

	Cholesterol	Triglyceride	Copper	Zinc	Magnesium
Before Cu supplement	199.6 ± 26.8 mg/dL	112.4 ± 37 mg/dL	126 ± 22 μg/100 ml	1.47 ± 0.12 μg/100 ml	18.4 ± 1.5 mg/100 ml
After 12 wk of supplement	212.6 ± 40.7 mg/dL	101.8 ± 40 mg/dL	123 ± 16 μg/100 ml	1.44 ± 0.38 mg/ml	19.4 ± 1.6 mg/100 ml

the same in the seven subjects receiving the copper gluconate as it was among the seven other subjects receiving the placebo capsules.

Discussion

The currently estimated safe and adequate daily intake of copper is 2 to 3 mg/day (1). We found that 10 mg/day of copper as copper gluconate had no detectable effect on seven subjects. Since the number of subjects is small, it is possible that subtle or infrequent effects of copper accumulation may not have been detected in this study. A longer duration of supplementation may have shown an effect but it is known that very soluble copper complexes such as copper gluconate are readily excreted by the kidney or the copper is lost to other complexing agents (2). Intravenous infusions of up to 80 mg of copper/day as copper complexes for the treatment of arthritis have been given to patients with no long-term side effects (3). Our results support other findings that non-Wilson's diseased individuals excrete

excess amounts of absorbed copper not needed to meet tissue needs or to maintain liver stores under homeostatic conditions (4). 

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